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EMCORE CORPORATION 1600 EUBANK BLVD, S.E. ALBUQUERQUE, NM 87123				BARTON, JEFFREY THOMAS
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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* PAUL R. SHARPS,  
MARVIN B. CLEVENGER,  
and MARK A. STAN

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Appeal 2008-003519  
Application 10/723,456  
Technology Center 1700

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Decided: April 23, 2010

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Before CATHERINE Q. TIMM, JEFFREY T. SMITH, and  
BEVERLY A. FRANKLIN, *Administrative Patent Judges*.

TIMM, *Administrative Patent Judge*.

DECISION ON APPEAL

I. STATEMENT OF CASE

Appellants appeal under 35 U.S.C. § 134 from the Examiner's decision to reject claims 48-66, 68-80, and 82-98 under both 35 U.S.C. § 112, ¶ 1 and 35 U.S.C. 112, ¶ 2 on the basis that "substantially the same

composition and thickness,” as required by all the claims, lacks written descriptive support and is indefinite. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

Appellants’ invention relates to a multijunction solar cell with at least one integral monolithic bypass diode (Spec. 3:33-34). The bypass diode is part of a means for passing current away from a shadowed or damaged solar cell (Spec. 1:32 to 2:3). Claim 48 is illustrative (emphasis added to highlight the language at issue):

48. An integrated semiconductor structure comprising:

a multijunction solar cell including a first photoactive junction formed in a substrate forming a bottom subcell where there are no subcells located between the bottom subcell and the lower surface of the substrate, and a second photoactive junction formed in a region overlying said bottom subcell and forming a second subcell; and

means for passing current when said multijunction solar cell is shaded, wherein said means is on the same substrate as the multijunction solar cell, wherein said means and said bottom subcell have an identical sequence of semiconductor layers, wherein each semiconductor layer in the means has *substantially the same composition and thickness* as the corresponding layer in the bottom subcell, wherein the means for passing current is electrically connected in parallel across the multijunction solar cell.

## II. DISPOSITIVE ISSUES

The Examiner finds that the claims fail to comply with the written description requirement because the word “substantially” is never used in the originally filed disclosure to describe any part of the invention, and the

word "substantially" introduces a "fudge factor" that opens up whatever it is modifying to interpretation (Ans. 5). The Examiner determines that the claims are indefinite because it is not clear what variations in thickness and composition are encompassed by the term "substantially the same composition and thickness" (Ans. 5-7).

Appellants contend that the claims meet the written description requirement because a person of ordinary skill in the art would have understood that deposition processes of the type described in the Application inherently result in small variations in layer thickness and composition, as evidenced by the Sharps Declaration (Br. 6-8). Appellants contend that the claims are definite because one of ordinary skill in the art, as evidenced by the Sharps Declaration, would understand that "substantially" corresponds to normal variations of up to 2 to 3% in composition and thickness (Br. 8-9).

The following issues arise:

Did the Examiner err in finding that "substantially the same composition and thickness" lacks written descriptive support in the specification as originally filed?

Did the Examiner err in concluding that "substantially the same composition and thickness" is indefinite because it is unclear what is encompassed by that language?

### III. FINDINGS OF FACT

The following Findings of Fact are particularly relevant for disposing of the issue on appeal.

Appellants' Specification describes the solar cell 100 depicted in Figure 1. The Specification indicates that the solar cell is made up of layers

and specifies the composition of those layers. (Spec. 4:9-16.) The Specification does not discuss the thickness of the layers, nor does it disclose that the layers should be of uniform thickness and composition (*See Spec., generally*).

Appellants' Specification describes forming the structure by etching the multi-junction solar cell depicted in Figure 3 (Spec. 5:27 to 8:4). Figure 3 shows the starting structure and is reproduced below:

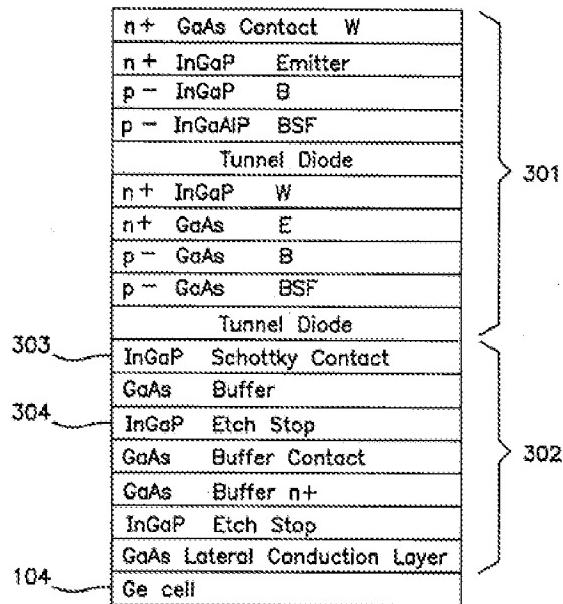


FIG. 3

Fig. 3 depicts a multi-junction solar cell prior to processing (Spec. 3:19-20)

As shown in Figure 3, the starting structure consists of a number of layers. The Specification does not provide details as to how these layers are formed except to say that the layers are grown, formed by diffusion, or inserted (Spec. 5:27 to 6:6).

The integral bypass diode is formed by etching the starting structure shown in Figure 3. Figure 4 shows the etched structure after a first etching step. Figure 4 is reproduced below:

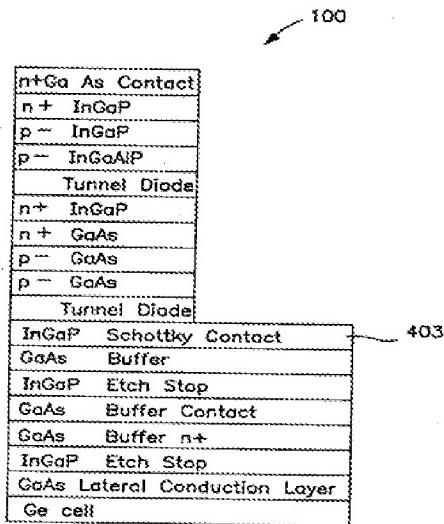


FIG. 4

Figure 4 depicts the structure after the first etching step  
(Spec. 3:21-22)

Figure 5 shows the separated structures after two more etching steps (etches 501 and 502). Figure 5 is reproduced below:

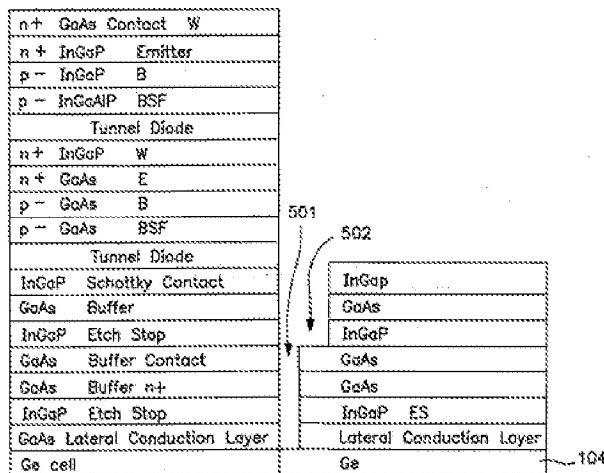


FIG. 5

Etch 501 electrically separates the solar cell (shown on the left of Figure 5) from the bypass diode (shown on the right of Figure 5). To complete the structure, contacts 109 and 110 as well as metal layer 107 are metallized onto the structure. The end product is shown in Figure 1, which is reproduced below:

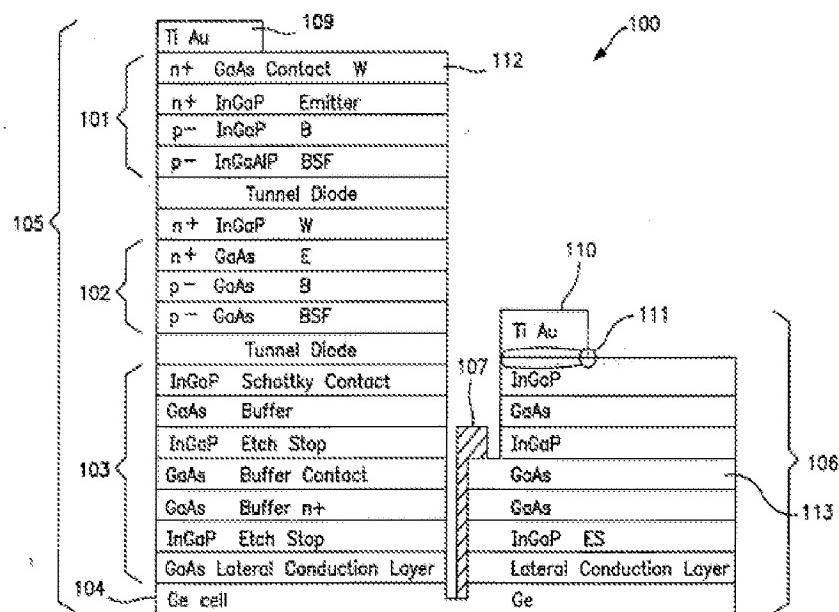


FIG. 1

The layers of the diode 106 shown on the right of Figure 1 do not have the same labels as the corresponding layers (buffer layers 103) of the solar cell shown on the left of Figure 1.

The Specification discloses "[m]odifying the thickness of the various layers in the diode 106" as a way "to decrease resistance in the diode 106." (Spec. 7:17-18.)

Sharps declares that "the nature of the deposition process inherently results in small variations both in composition and thickness of each layer over the surface of the wafer." (Sharps' Dec. ¶ 4.) Sharps further declares that "variations of two to three percent in composition and in the thickness of the compound semiconductor layer over the surface of the wafer are quite normal and in fact are well within manufacturing specifications for actual commercial products." (Sharps' Dec. ¶ 5.)

The Specification fails to define or provide any guidance as to the meaning of "substantially the same composition and thickness."

#### IV. PRINCIPLES OF LAW

To comply with the written description requirement of 35 U.S.C. § 112, ¶ 1, the disclosure of the application must "clearly allow persons of ordinary skill in the art to recognize that the inventor invented what is claimed." *Ariad Pharms., Inc. v. Eli Lilly and Co.*, --- F.3d ----, 2010 WL 1007369, at \*12, \*14 (Fed. Cir. 2010) (en banc). While the words of the disclosure need not match those of the claim, the description must do more than merely disclose that which would render the claimed invention obvious. *ICU Medical, Inc. v. Alaris Medical Sys., Inc.*, 558 F.3d 1368, 1377 (Fed.

Cir. 2009). What the written description must do is actually or inherently disclose the claim element. *PowerOasis, Inc. v. T-Mobile USA, Inc.*, 522 F.3d 1299, 1306-07 (Fed.Cir.2008). While it is permissible to add inherent properties or characteristics of the invention to the disclosure and claims, *Kennecott Corp. v. Kyocera Int'l, Inc.*, 835 F.2d 1419 (Fed.Cir.1987), the inherent properties or characteristics must inevitably occur when one of ordinary skill in the art follows the teachings of the original disclosure. *Dreyfus v. Sternau*, 357 F.2d 411, 415 (CCPA 1966); *see also Pingree v. Hull*, 518 F.2d 624, 627-28 (CCPA 1975). Moreover, the description must itself provide a basis for support, evidence of what was known to one of ordinary skill in the art will not fill the gap. *In re MacLean*, 454 F.2d 756, 759 (CCPA 1972) (“Preponderantly water” found not supported by a specification generically disclosing using water and including an example of using 93% water where other evidence established that the process, by definition, used an appreciable or high concentration of solvent).

35 U.S.C. § 112, ¶ 2 requires that the specification “conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.” This section of the statute puts the burden of precise claim drafting squarely on the applicant. *In re Morris*, 127 F.3d 1048, 1056 (Fed. Cir. 1997). This means that when using a term of degree such as “substantially,” the drafter must provide the written description with some guidelines, examples, or some other standard for measuring that degree sufficient to permit one of ordinary skill in the art to determine what is encompassed. *See Seattle Box Co. v. Industrial Crating & Packing, Inc.*, 731 F.2d 818, 826 (Fed. Cir. 1984) (“[w]hen a word of

degree is used the district court must determine whether the patent's specification provides some standard for measuring that degree."); *In re Marosi*, 710 F.2d 799, 803 (Fed. Cir. 1983) (The claim language "essentially free of alkali metal" was definite because the specification provided guidelines and examples such that the ordinary artisan would draw the line between unavoidable impurities in starting materials and essential ingredients.); *In re Mattison*, 509 F.2d 563, 564-65 (CCPA 1975) (general guidelines and examples in the specification were sufficient to permit one of ordinary skill in the art to select a substituent that would "substantially increase the efficiency of the compound as a copper extractant").

## V. ANALYSIS

Reviewing all the evidence as a whole, we find that the Specification fails to convey to one of ordinary skill in the art that Appellants intended to create corresponding solar cell layers (subcell layers 103) and buffer layers (diode layers 106) of the same or substantially the same composition and thickness.

The Specification is silent with regard to holding the thickness constant. In fact, the Specification seems to indicate that the thickness of the diode layers may be modified apart from the thickness of the solar cell layers of subcell 103 (Spec. 7:17-18.).

Without any indication that the Appellants intended to hold the composition and thickness constant throughout each layer, the fact that each of the corresponding layers is formed by dividing a single deposited layer is simply not enough to support the new claim limitation. There is no evidence on this record that Appellants were using a process that necessarily would

result in depositing layers of uniform composition and thickness. In fact, the Specification provides no specific details of the layer forming processes.

While it may have been obvious to have held the composition and thickness constant, that concept is not present in the Specification. Under the circumstances, the Specification does not support the further concept of maintaining the composition and thickness within some prescribed range that would be encompassed by the word substantially. The evidence therefore supports the position of the Examiner with regard to lack of written descriptive support.

It is not particularly relevant under the facts of this case as to what variation inherently occurs during the normal deposition of semiconductor layers when the ordinary artisan was seeking to hold the composition and thickness constant. There is simply no indication in the original written description that the Appellants themselves intended to hold the layer composition and thickness constant.

With regard to indefiniteness, we agree with the Examiner that the thickness variations of up to 2 to 3% Sharps declares to be normal in deposition processes for forming uniform layers does not render the claims definite because there is no description of such “normal variations” in the Specification as filed (answer 7).<sup>1</sup> In fact, there is no guidance in the

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<sup>1</sup> Moreover, the statements provided in Declaration are not probative. The declarant purports to provide an opinion regarding the knowledge and expectation of a person of ordinary skill in the art. However, the credentials of the declarant have not been provided in the Declaration. Furthermore, factual support for the statements contained in the Declaration has not been identified. That is, the declarant has not indicated what evidence was utilized in formulating the opinions expressed in the declaration.

Specification with regard to the thickness profile, much less guidance with regard to tolerances allowed for the thickness. Therefore, we cannot say there is any guidance in the Specification sufficient to permit one of ordinary skill in the art to determine what composition and thickness variations the word "substantially" would encompass.

## VI. CONCLUSION

On the record before us, we sustain the rejections maintained by the Examiner.<sup>2</sup>

## VII. DECISION

The decision of the Examiner is affirmed.

## VIII. TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED

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Consequently, the declaration of Sharps is entitled to little weight. *In re Lindell*, 385 F.2d 453, 456, (CCPA 1967).

<sup>2</sup>Only those arguments actually made by Appellants have been considered in this decision. Arguments which Appellants could have made but chose not to make have not been considered and are deemed to be waived. See 37 C.F.R. § 41.37(c)(1)(vii) (2008).

Appeal 2008-003519  
Application 10/723,456

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